L. Baker

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES

REPORT OF SAMPLE DELIVERY GROUP #0200038

Project: NEUTRON PRODUCTS
Analysis Procedure: Gamma Spectrometry
Date Reported: 09/10/2002

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A2.03840M	NP #20	SAM	SEDIMENT	08/15/2002	08/19/2002
A2.03841N	NP #21	SAM	SEDIMENT	08/15/2002	08/19/2002
A2.03842P	BKG 01	SAM	SEDIMENT	08/14/2002	08/19/2002

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

for James B. Moore 9/12/02
Mary F. Wisdom Date
Quality Assurance Coordinator

for Anya B. Hudson 9/12/02
John Griggs, Ph.D. Date
Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "*Z* scores." A *Z* score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The *Z* score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The *Z* score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the *Z* score is computed.

Each standard uncertainty used to compute a *Z* score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Th-234, Pa-234m, Ra-226, Th-231, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0200038

ANALYSIS SUMMARY

Analysis Procedure: NAREL GAM-01
Title: Gamma Spectrometry

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A2.03840M		N/A	08/30/2002	0007067B	0002582K
A2.03840M	DUP	N/A	09/04/2002	0007067B	0002582K
A2.03841N		N/A	08/30/2002	0007067B	0002582K
A2.03842P		N/A	08/30/2002	0007067B	0002582K

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0200038

SAMPLE ANALYSIS REPORT

Sample #:	A2.03840M	QC batch #:	0002582K
Matrix:	SEDIMENT	Prep batch #:	0007067B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	6.020e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	85.02 %	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

Comment: CULVERT OUTFALL

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/29/2002 13:32	1000.0	GE07	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		1.0e-01	PCI/GDRY	08/15/2002
Be7		9.45e-01	9.8e-02		PCI/GDRY	08/15/2002
Bi212		4.24e-01	1.2e-01		PCI/GDRY	08/15/2002
Bi214	*	3.87e-01	3.2e-02		PCI/GDRY	08/15/2002
Co60		1.50e-01	1.2e-02		PCI/GDRY	08/15/2002
Cs137		1.47e-02	7.2e-03		PCI/GDRY	08/15/2002
I131		ND		4.7e-02	PCI/GDRY	08/15/2002
K40		5.83e+00	3.8e-01		PCI/GDRY	08/15/2002
Pb212		5.05e-01	3.7e-02		PCI/GDRY	08/15/2002
Pb214	*	4.59e-01	3.5e-02		PCI/GDRY	08/15/2002
Ra224		3.13e-01	2.5e-01		PCI/GDRY	08/15/2002
Ra226	*	9.51e-01	2.3e-01		PCI/GDRY	08/15/2002
Ra228		4.26e-01	3.9e-02		PCI/GDRY	08/15/2002
Tl208		1.57e-01	1.5e-02		PCI/GDRY	08/15/2002

* An asterisk indicates a result whose value may be significantly over or underestimated.

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0200038

SAMPLE ANALYSIS REPORT

Sample #:	A2.03840M	QC batch #:	0002582K
Matrix:	SEDIMENT	Prep batch #:	0007067B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	6.020e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	85.02 %	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	DUP

Comment: CULVERT OUTFALL

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
09/03/2002 16:30	1000.0	GE02	RCL

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		1.9e-01	PCI/GDRY	08/15/2002
Be7		8.45e-01	1.3e-01		PCI/GDRY	08/15/2002
Bi212		6.05e-01	1.6e-01		PCI/GDRY	08/15/2002
Bi214	*	4.17e-01	3.8e-02		PCI/GDRY	08/15/2002
Co60		1.60e-01	1.5e-02		PCI/GDRY	08/15/2002
Cs137		ND		2.4e-02	PCI/GDRY	08/15/2002
I131		ND		9.2e-02	PCI/GDRY	08/15/2002
K40		5.67e+00	4.4e-01		PCI/GDRY	08/15/2002
Pb212		5.04e-01	3.8e-02		PCI/GDRY	08/15/2002
Pb214	*	4.50e-01	3.6e-02		PCI/GDRY	08/15/2002
Ra226	*	8.53e-01	2.5e-01		PCI/GDRY	08/15/2002
Ra228		4.11e-01	4.5e-02		PCI/GDRY	08/15/2002
Tl208		1.47e-01	1.8e-02		PCI/GDRY	08/15/2002

* An asterisk indicates a result whose value may be significantly over or underestimated.

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0200038

SAMPLE ANALYSIS REPORT

Sample #:	A2.03841N	QC batch #:	0002582K
Matrix:	SEDIMENT	Prep batch #:	0007067B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.920e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	79.08 %	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

Comment: CULVERT INLET

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/29/2002 13:32	1000.0	GE08	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		2.7e-01	PCI/GDRY	08/15/2002
Be7		7.11e-01	2.0e-01		PCI/GDRY	08/15/2002
Bi212		6.22e-01	3.2e-01		PCI/GDRY	08/15/2002
Bi214	*	5.88e-01	5.9e-02		PCI/GDRY	08/15/2002
Co60		6.61e+00	3.8e-01		PCI/GDRY	08/15/2002
Cs137		1.17e-01	2.3e-02		PCI/GDRY	08/15/2002
I131		ND		9.6e-02	PCI/GDRY	08/15/2002
K40		1.08e+01	7.1e-01		PCI/GDRY	08/15/2002
Pb212		7.78e-01	5.9e-02		PCI/GDRY	08/15/2002
Pb214	*	6.21e-01	5.4e-02		PCI/GDRY	08/15/2002
Ra224		6.35e-01	4.5e-01		PCI/GDRY	08/15/2002
Ra226	*	1.50e+00	4.0e-01		PCI/GDRY	08/15/2002
Ra228		5.91e-01	8.9e-02		PCI/GDRY	08/15/2002
Th234	*	7.37e-01	1.8e-01		PCI/GDRY	08/15/2002
Tl208		2.51e-01	2.8e-02		PCI/GDRY	08/15/2002

* An asterisk indicates a result whose value may be significantly over or underestimated.

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GAMMA ANALYSES
SDG #0200038

SAMPLE ANALYSIS REPORT

Sample #:	A2.03842P	QC batch #:	0002582K
Matrix:	SEDIMENT	Prep batch #:	0007067B
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.830e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	76.96 %	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

Comment: MONOCACY CREEK SEDIMENT

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/29/2002 13:31	1000.0	GE09	KNG

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		1.2e-01	PCI/GDRY	08/14/2002
Be7		2.47e-01	7.1e-02		PCI/GDRY	08/14/2002
Bi212		5.38e-01	1.1e-01		PCI/GDRY	08/14/2002
Bi214	*	3.46e-01	2.8e-02		PCI/GDRY	08/14/2002
Co60		ND		1.8e-02	PCI/GDRY	08/14/2002
Cs137		1.32e-02	7.6e-03		PCI/GDRY	08/14/2002
I131		ND		5.1e-02	PCI/GDRY	08/14/2002
K40		9.20e+00	5.7e-01		PCI/GDRY	08/14/2002
Pb212		5.96e-01	4.1e-02		PCI/GDRY	08/14/2002
Pb214	*	4.10e-01	3.1e-02		PCI/GDRY	08/14/2002
Ra224		4.44e-01	2.4e-01		PCI/GDRY	08/14/2002
Ra226	*	9.31e-01	2.1e-01		PCI/GDRY	08/14/2002
Ra228		5.11e-01	4.0e-02		PCI/GDRY	08/14/2002
Th234	*	8.89e-01	2.0e-01		PCI/GDRY	08/14/2002
Tl208		1.79e-01	1.5e-02		PCI/GDRY	08/14/2002

* An asterisk indicates a result whose value may be significantly over or underestimated.

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0200038

QC BATCH SUMMARY

QC batch #: 0002582K
Preparation procedure: N/A
Analysis procedure: NAREL GAM-01

NAREL Sample #	QC Type	Yield (%)	± 2σ Uncertainty (%)	Analyst
A2.03840M		N/A		N/A
A2.03840M	DUP	N/A		N/A
A2.03841N		N/A		N/A
A2.03842P		N/A		N/A

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #.: 0002582K Analytical Procedure: NAREL GAM-01

LABORATORY DUPLICATES (PCI/GDRY)

Sample ID	Nuclide	Original ± 2σ	Duplicate ± 2σ	RPD	Z
A2.03840M	BA140				
A2.03840M	BE7	9.45e-01 ± 9.8e-02	8.45e-01 ± 1.3e-01	11.17	-0.97 OK
A2.03840M	BI212	4.24e-01 ± 1.2e-01	6.05e-01 ± 1.6e-01	35.18	1.68 OK
A2.03840M	BI214	3.87e-01 ± 3.2e-02	4.17e-01 ± 3.8e-02	7.46	0.80 OK
A2.03840M	CO60	1.50e-01 ± 1.2e-02	1.60e-01 ± 1.5e-02	6.45	0.68 OK
A2.03840M	CS137	1.47e-02 ± 7.2e-03			
A2.03840M	I131				
A2.03840M	K40	5.83e+00 ± 3.8e-01	5.67e+00 ± 4.4e-01	2.78	-0.32 OK
A2.03840M	PB212	5.05e-01 ± 3.7e-02	5.04e-01 ± 3.8e-02	0.20	-0.02 OK
A2.03840M	PB214	4.59e-01 ± 3.5e-02	4.50e-01 ± 3.6e-02	1.98	-0.22 OK
A2.03840M	RA226	9.51e-01 ± 2.3e-01	8.53e-01 ± 2.5e-01	10.86	-0.54 OK
A2.03840M	RA228	4.26e-01 ± 3.9e-02	4.11e-01 ± 4.5e-02	3.58	-0.36 OK
A2.03840M	TL208	1.57e-01 ± 1.5e-02	1.47e-01 ± 1.8e-02	6.58	-0.64 OK

Analyst: N/A

QA Officer: Kirk D. McEwen 9/11/02

L. Baker

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES

REPORT OF SAMPLE DELIVERY GROUP #0200039

Project: NEUTRON PRODUCTS
Analysis Procedure: Gamma Spectrometry
Date Reported: 09/10/2002

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A2.03843Q	BKG 02	SAM	WATER	08/14/2002	08/19/2002

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

for James B. Moore 9/12/02
Mary F. Wisdom Date
Quality Assurance Coordinator

Sonya B. Hudson 9/12/02
for John Griggs, Ph.D. Date
Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "*Z* scores." A *Z* score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The *Z* score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The *Z* score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the *Z* score is computed.

Each standard uncertainty used to compute a *Z* score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Th-234, Pa-234m, Ra-226, Th-231, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0200039

ANALYSIS SUMMARY

Analysis Procedure: NAREL GAM-01
Title: Gamma Spectrometry

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A2.03843Q		N/A	08/30/2002	0007035T	0002583L
A2.03843Q	DUP	N/A	08/23/2002	0007035T	0002583L

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0200039

SAMPLE ANALYSIS REPORT

Sample #:	A2.03843Q	QC batch #:	0002583L
Matrix:	WATER	Prep batch #:	0007035T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

Comment: LITTLE MONOCACY CREEK

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/29/2002 13:31	1000.0	GE04	KNG

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		3.4e+01	PCI/L	08/14/2002
Co60	ND		5.5e+00	PCI/L	08/14/2002
Cs137	ND		4.9e+00	PCI/L	08/14/2002
I131	ND		1.5e+01	PCI/L	08/14/2002
K40	ND		4.8e+01	PCI/L	08/14/2002
Ra226	ND		8.1e+01	PCI/L	08/14/2002
Ra228	ND		1.7e+01	PCI/L	08/14/2002

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0200039

SAMPLE ANALYSIS REPORT

Sample #:	A2.03843Q	QC batch #:	0002583L
Matrix:	WATER	Prep batch #:	0007035T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	DUP

Comment: LITTLE MONOCACY CREEK

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/22/2002 14:14	1000.0	GE12	KNG

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140	ND		2.0e+01	PCI/L	08/14/2002
Co60	ND		4.4e+00	PCI/L	08/14/2002
Cs137	ND		4.5e+00	PCI/L	08/14/2002
I131	ND		6.9e+00	PCI/L	08/14/2002
K40	ND		5.0e+01	PCI/L	08/14/2002
Pb212	3.60e+00	4.8e+00		PCI/L	08/14/2002
Ra226	ND		6.6e+01	PCI/L	08/14/2002
Ra228	ND		1.4e+01	PCI/L	08/14/2002

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0200039

QC BATCH SUMMARY

QC batch #: 0002583L
Preparation procedure: N/A
Analysis procedure: NAREL GAM-01

NAREL Sample #	QC Type	Yield (%)	± 2σ Uncertainty (%)	Analyst
A2.03843Q		N/A		N/A
A2.03843Q	DUP	N/A		N/A

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0002583L Analytical Procedure: NAREL GAM-01

LABORATORY DUPLICATES (PCI/L)

Sample ID	Nuclide	Original ± 2σ	Duplicate ± 2σ	RPD	Z
A2.03843Q	BA140				
A2.03843Q	CO60				
A2.03843Q	CS137				
A2.03843Q	I131				
A2.03843Q	K40				
A2.03843Q	RA226				
A2.03843Q	RA228				

Analyst: N/A _____ _____

QA Officer: Kirk D McElroy _____ 9/11/02

L. Baker

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES

REPORT OF SAMPLE DELIVERY GROUP #0200037

Project: NEUTRON PRODUCTS
Analysis Procedure: Gross Alpha and Beta on Solid Samples
Date Reported: 09/10/2002

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A2.03832M	NP #12	SAM	SOIL	08/15/2002	08/19/2002
A2.03833N	NP #13	SAM	SOIL	08/15/2002	08/19/2002
A2.03834P	NP #14	SAM	SOIL	08/15/2002	08/19/2002
A2.03835Q	NP #15	SAM	SOIL	08/15/2002	08/19/2002
A2.03836R	NP #16	SAM	SOIL	08/15/2002	08/19/2002
A2.03837T	NP #17	SAM	SOIL	08/15/2002	08/19/2002
A2.03838U	NP #18	SAM	SOIL	08/15/2002	08/19/2002
A2.03839V	NP #19	SAM	SOIL	08/15/2002	08/19/2002
A2.03844R	BKG 03	SAM	SOIL	08/14/2002	08/19/2002
A2.03845T	BKG 04	SAM	SOIL	08/15/2002	08/19/2002

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Mary F. Wisdom — Date
Quality Assurance Coordinator

John Griggs — 9/20/02

John Griggs, Ph.D. — Date
Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "*Z* scores." A *Z* score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The *Z* score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The *Z* score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the *Z* score is computed.

Each standard uncertainty used to compute a *Z* score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GROSS ALPHA AND BETA ANALYSIS

In comparison to the methods employed to determine radionuclide-specific activities, the method employed by NAREL to determine gross alpha and beta activity has the potential for greater analytical bias. This is especially true for solid samples. It should be noted that this potential analytical uncertainty is not included in the two-sigma counting uncertainty term. Therefore, gross alpha and beta results should be used as gross approximations of the alpha and beta activity present.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0200037

ANALYSIS SUMMARY

Analysis Procedure: NAREL GR-03
Title: Gross Alpha and Beta on Solid Samples

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A2.03832M		N/A	08/30/2002	0007074A	0002565J
A2.03833N		N/A	08/30/2002	0007074A	0002565J
A2.03834P		N/A	08/30/2002	0007074A	0002565J
A2.03835Q		N/A	08/30/2002	0007074A	0002565J
A2.03835Q	DUP	N/A	08/30/2002	0007074A	0002565J
A2.03836R		N/A	08/30/2002	0007074A	0002565J
A2.03837T		N/A	08/30/2002	0007074A	0002565J
A2.03838U		N/A	08/30/2002	0007074A	0002565J
A2.03839V		N/A	08/30/2002	0007074A	0002565J
A2.03844R		N/A	08/30/2002	0007074A	0002565J
A2.03845T *		N/A	08/30/2002	0007074A	0002565J

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0200037

SAMPLE ANALYSIS REPORT

Sample #:	A2.03832M	QC batch #:	0002565J
Matrix:	SOIL	Prep batch #:	0007074A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GDRY	Analysis procedure:	NAREL GR-03
Dry/wet weight:	79.98 %	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	ANA

Comment: 8 FT. FROM BACK FENCE

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/30/2002 09:25	100.0	G54A	MHW

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Alpha	1.39e+01	1.1e+01	8.0e+00	PCI/GDRY	08/30/2002
Beta	2.82e+01	5.1e+00	5.3e+00	PCI/GDRY	08/30/2002

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0200037

SAMPLE ANALYSIS REPORT

Sample #:	A2.03833N	QC batch #:	0002565J
Matrix:	SOIL	Prep batch #:	0007074A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GDRY	Analysis procedure:	NAREL GR-03
Dry/wet weight:	91.22 %	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	ANA

Comment: 1 METER WEST OF NP #12

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/30/2002 09:25	100.0	G54C	MHW

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Alpha	9.86e+00	1.0e+01	6.7e+00	PCI/GDRY	08/30/2002
Beta	3.45e+01	5.3e+00	4.9e+00	PCI/GDRY	08/30/2002

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ALPBET ANALYSES
SDG #0200037

SAMPLE ANALYSIS REPORT

Sample #:	A2.03834P	QC batch #:	0002565J
Matrix:	SOIL	Prep batch #:	0007074A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.980e-02 GDRY	Analysis procedure:	NAREL GR-03
Dry/wet weight:	82.57 %	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	ANA

Comment: SOUTH POWER POLE - WEST PROPERTY LINE

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/30/2002 09:25	100.0	G54D	MHW

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Alpha	2.34e+01	1.2e+01	6.9e+00	PCI/GDRY	08/30/2002
Beta	4.69e+01	5.9e+00	5.1e+00	PCI/GDRY	08/30/2002

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0200037

SAMPLE ANALYSIS REPORT

Sample #:	A2.03835Q	QC batch #:	0002565J
Matrix:	SOIL	Prep batch #:	0007074A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.002e-01 GDRY	Analysis procedure:	NAREL GR-03
Dry/wet weight:	83.54 %	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	ANA

Comment: FENCE LINE - SW CORNER

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/30/2002 11:05	100.0	G54A	MHW

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Alpha	1.73e+01	1.2e+01	8.0e+00	PCI/GDRY	08/30/2002
Beta	4.42e+01	5.9e+00	5.4e+00	PCI/GDRY	08/30/2002

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0200037

SAMPLE ANALYSIS REPORT

Sample #:	A2.03835Q	QC batch #:	0002565J
Matrix:	SOIL	Prep batch #:	0007074A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.960e-02 GDRY	Analysis procedure:	NAREL GR-03
Dry/wet weight:	83.54 %	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	DUP

Comment: FENCE LINE - SW CORNER

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/30/2002 11:05	100.0	G54C	MHW

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Alpha	1.57e+01	1.1e+01	6.7e+00	PCI/GDRY	08/30/2002
Beta	5.17e+01	6.2e+00	5.0e+00	PCI/GDRY	08/30/2002

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0200037

SAMPLE ANALYSIS REPORT

Sample #:	A2.03836R	QC batch #:	0002565J
Matrix:	SOIL	Prep batch #:	0007074A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.002e-01 GDRY	Analysis procedure:	NAREL GR-03
Dry/wet weight:	86.50 %	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	ANA

Comment: 5 FT. W OF FENCE

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/30/2002 11:05	100.0	G54D	MHW

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Alpha	1.70e+01	1.1e+01	6.9e+00	PCI/GDRY	08/30/2002
Beta	3.18e+01	5.2e+00	4.9e+00	PCI/GDRY	08/30/2002

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0200037

SAMPLE ANALYSIS REPORT

Sample #:	A2.03837T	QC batch #:	0002565J
Matrix:	SOIL	Prep batch #:	0007074A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.002e-01 GDRY	Analysis procedure:	NAREL GR-03
Dry/wet weight:	88.18 %	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	ANA

Comment: RR SIDING - 2 1/2 POSTS E OF SW CORNER

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/30/2002 12:46	100.0	G54A	MHW

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Alpha	1.14e+01	1.1e+01	8.0e+00	PCI/GDRY	08/30/2002
Beta	8.00e+01	7.3e+00	5.3e+00	PCI/GDRY	08/30/2002

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0200037

SAMPLE ANALYSIS REPORT

Sample #:	A2.03838U	QC batch #:	0002565J
Matrix:	SOIL	Prep batch #:	0007074A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.004e-01 GDRY	Analysis procedure:	NAREL GR-03
Dry/wet weight:	96.16 %	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	ANA

Comment: 5 FT. E OF STOP SIGN

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/30/2002 12:46	100.0	G54C	MHW

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Alpha	1.23e+01	1.1e+01	6.7e+00	PCI/GDRY	08/30/2002
Beta	2.30e+01	4.7e+00	4.9e+00	PCI/GDRY	08/30/2002

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0200037

SAMPLE ANALYSIS REPORT

Sample #:	A2.03839V	QC batch #:	0002565J
Matrix:	SOIL	Prep batch #:	0007074A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.890e-02 GDRY	Analysis procedure:	NAREL GR-03
Dry/wet weight:	93.43 %	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	ANA

Comment: WHITE HOUSE LAWN

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/30/2002 12:46	100.0	G54D	MHW

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Alpha	1.31e+01	1.1e+01	6.9e+00	PCI/GDRY	08/30/2002
Beta	4.05e+01	5.6e+00	4.9e+00	PCI/GDRY	08/30/2002

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0200037

SAMPLE ANALYSIS REPORT

Sample #:	A2.03844R	QC batch #:	0002565J
Matrix:	SOIL	Prep batch #:	0007074A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.880e-02 GDRY	Analysis procedure:	NAREL GR-03
Dry/wet weight:	92.49 %	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	ANA

Comment: DICKERSON CONSERVATION PARK

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/30/2002 14:26	100.0	G54A	MHW

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Alpha	1.06e+01	1.1e+01	8.1e+00	PCI/GDRY	08/30/2002
Beta	2.66e+01	5.1e+00	5.3e+00	PCI/GDRY	08/30/2002

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0200037

SAMPLE ANALYSIS REPORT

Sample #:	A2.03845T	QC batch #:	0002565J
Matrix:	SOIL	Prep batch #:	0007074A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.007e-01 GDRY	Analysis procedure:	NAREL GR-03
Dry/wet weight:	91.30 %	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	ANA

Comment: FIRE STATION - BEALSVILLE

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/30/2002 14:26	100.0	G54C	MHW

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Alpha	1.90e+01	1.2e+01	6.7e+00	PCI/GDRY	08/30/2002
Beta	3.01e+01	5.1e+00	5.1e+00	PCI/GDRY	08/30/2002

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0200037

QC BATCH SUMMARY

QC batch #: 0002565J
Preparation procedure: N/A
Analysis procedure: NAREL GR-03

NAREL Sample #	QC Type	Yield (%)	± 2σ Uncertainty (%)	Analyst
A2.03832M		N/A		EFG
A2.03833N		N/A		EFG
A2.03834P		N/A		EFG
A2.03835Q		N/A		EFG
A2.03835Q	DUP	N/A		EFG
A2.03836R		N/A		EFG
A2.03837T		N/A		EFG
A2.03838U		N/A		EFG
A2.03839V		N/A		EFG
A2.03844R		N/A		EFG
A2.03845T		N/A		EFG

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0002565J Analytical Procedure: NAREL GR-03

LABORATORY DUPLICATES (PCI/GDRY)

Sample ID	Nuclide	Original ± 2σ	Duplicate ± 2σ	RPD	Z
A2.03835Q	ALPHA	1.73e+01 ± 1.2e+01	1.57e+01 ± 1.1e+01	9.46	-0.19 OK
A2.03835Q	BETA	4.42e+01 ± 5.9e+00	5.17e+01 ± 6.2e+00	15.49	1.36 OK

Analyst: Eunice F. Gatlin 9/4/02
Gatlin, Eunice F.

QA Officer: Karl D. McFlow 9/4/02

L. Baker

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES

REPORT OF SAMPLE DELIVERY GROUP #0200038

Project: NEUTRON PRODUCTS
Analysis Procedure: Gross Alpha and Beta on Solid Samples
Date Reported: 09/10/2002

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A2.03840M	NP #20	SAM	SEDIMENT	08/15/2002	08/19/2002
A2.03841N	NP #21	SAM	SEDIMENT	08/15/2002	08/19/2002
A2.03842P	BKG 01	SAM	SEDIMENT	08/14/2002	08/19/2002

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

for James S. Moore 9/20/02
Mary F. Wisdom Date
Quality Assurance Coordinator

John Griggs 9/20/02
John Griggs, Ph.D. Date
Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "*Z* scores." A *Z* score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The *Z* score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The *Z* score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the *Z* score is computed.

Each standard uncertainty used to compute a *Z* score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GROSS ALPHA AND BETA ANALYSIS

In comparison to the methods employed to determine radionuclide-specific activities, the method employed by NAREL to determine gross alpha and beta activity has the potential for greater analytical bias. This is especially true for solid samples. It should be noted that this potential analytical uncertainty is not included in the two-sigma counting uncertainty term. Therefore, gross alpha and beta results should be used as gross approximations of the alpha and beta activity present.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0200038

ANALYSIS SUMMARY

Analysis Procedure: NAREL GR-03
Title: Gross Alpha and Beta on Solid Samples

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A2.03840M		N/A	08/29/2002	0007073Z	0002564H
A2.03840M	DUP	N/A	08/29/2002	0007073Z	0002564H
A2.03841N		N/A	08/29/2002	0007073Z	0002564H
A2.03842P		N/A	08/29/2002	0007073Z	0002564H

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0200038

SAMPLE ANALYSIS REPORT

Sample #:	A2.03840M	QC batch #:	0002564H
Matrix:	SEDIMENT	Prep batch #:	0007073Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GDRY	Analysis procedure:	NAREL GR-03
Dry/wet weight:	85.02 %	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	ANA

Comment: CULVERT OUTFALL

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/29/2002 15:59	100.0	G54A	MHW

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Alpha	1.27e+01	1.1e+01	8.3e+00	PCI/GDRY	08/29/2002
Beta	1.22e+01	4.1e+00	5.1e+00	PCI/GDRY	08/29/2002

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0200038

SAMPLE ANALYSIS REPORT

Sample #:	A2.03840M	QC batch #:	0002564H
Matrix:	SEDIMENT	Prep batch #:	0007073Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GDRY	Analysis procedure:	NAREL GR-03
Dry/wet weight:	85.02 %	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	DUP

Comment: CULVERT OUTFALL

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/29/2002 15:59	100.0	G54B	MHW

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Alpha	5.98e+00	1.0e+01	9.6e+00	PCI/GDRY	08/29/2002
Beta	1.06e+01	4.0e+00	5.1e+00	PCI/GDRY	08/29/2002

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0200038

SAMPLE ANALYSIS REPORT

Sample #:	A2.03841N	QC batch #:	0002564H
Matrix:	SEDIMENT	Prep batch #:	0007073Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GDRY	Analysis procedure:	NAREL GR-03
Dry/wet weight:	79.08 %	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	ANA

Comment: CULVERT INLET

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/29/2002 15:59	100.0	G54C	MHW

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Alpha	1.25e+01	1.1e+01	8.0e+00	PCI/GDRY	08/29/2002
Beta	2.29e+01	4.7e+00	4.9e+00	PCI/GDRY	08/29/2002

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ALPBET ANALYSES
SDG #0200038

SAMPLE ANALYSIS REPORT

Sample #:	A2.03842P	QC batch #:	0002564H
Matrix:	SEDIMENT	Prep batch #:	0007073Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GDRY	Analysis procedure:	NAREL GR-03
Dry/wet weight:	76.96 %	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	ANA

Comment: MONOCACY CREEK SEDIMENT

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
08/29/2002 15:59	100.0	G54D	MHW

ANALYTICAL RESULTS

Analyte	Activity	± 2σ Uncertainty	MDC	Unit	Date
Alpha	3.72e+00	9.1e+00	7.3e+00	PCI/GDRY	08/29/2002
Beta	1.50e+01	4.1e+00	4.6e+00	PCI/GDRY	08/29/2002

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QC BATCH SUMMARY

QC batch #: 0002564H
Preparation procedure: N/A
Analysis procedure: NAREL GR-03

NAREL Sample #	QC Type	Yield (%)	± 2σ Uncertainty (%)	Analyst
A2.03840M		N/A		EFG
A2.03840M	DUP	N/A		EFG
A2.03841N		N/A		EFG
A2.03842P		N/A		EFG

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0002564H Analytical Procedure: NAREL GR-03

LABORATORY DUPLICATES (PCI/GDRY)

Sample ID	Nuclide	Original ± 2σ	Duplicate ± 2σ	RPD	Z
A2.03840M	ALPHA	1.27e+01 ± 1.1e+01	5.98e+00 ± 1.0e+01	71.86	-0.88 OK
A2.03840M	BETA	1.22e+01 ± 4.1e+00	1.06e+01 ± 4.0e+00	14.26	-0.55 OK

Analyst: Eunice F. Gatlin 8/30/02
Gatlin, Eunice F.

QA Officer: Mark D. McEwen 8/30/02